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ABSTRACT

Evidence from ethnology, anthropology, and educational history and research indicates that age segregation is neither necessary nor natural. An examination of primate and simple human societies suggests that rigid assumptions about age segregation of the young is a recent departure from social patterns existing for millions of years. The researcher summarizes the findings of 27 empirical studies in multiage grouping in elementary schools conducted between 1948 and 1981 in the United States and Canada: multiage grouping has no consistent relationship with academic achievement, and multiage grouping has a generally benign effect on social and emotional development. Naturalistic and observational studies on companionship outside the classroom provide further evidence on the importance of cross-age grouping. The general pattern that emerges from these studies is one of increased competition and aggression within same-age groups and increased harmony and nurturance within more natural multiage learning groups where younger members seem to benefit most. Two tables provide statistics from empirical studies on multiage grouping. (PB)

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AGE SEGREGATION IN SCHOOLS

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Age Segregation in Schools

ABSTRACT

This paper attempts to bring together evidence from ethology, anthropology, educational history, and educational research that throws light on the practice of age segregation in schools. Strict age segregation is unusual among primates and in simple societies, and is essentially a phenomenon of the last century. Research studies show no consistent benefits to age segregation, and some affective advantages from multiage grouping. It is concluded that, when curriculum or other reasons support a change in existing school structures, the need to group by age should not be viewed as imperative.

Age Segregation in Schools

Curriculum reform and school structures

The question addressed in this paper originated with a concern that was essentially curricular. Almost every attempt to rationalize or reform curriculum conflicts at some point with the structural features of schools, one of which is the organization of learning groups on the basis of age. Such strategies as individual progress, mastery learning, acceleration, remediation, specific prerequisites, and modular instruction can be implemented only with great difficulty if constrained by the requirement that students must learn in homogeneous age groups.

The tenacity with which schools cling to age segregation, and the anxiety of educators lest learners move out of their age group, prompt the questions: what is the justification for grouping learners by age, and what are the costs and benefits? This paper attempts to bring together evidence from ethology, anthropology, history, and education that throws light on these questions.

Age relations among primates

Apart from a few species that bear twins, the higher primates breed in litters of one. Frequency of giving birth ranges from once a year to once every five years. Consequently, primate young do not usually have same-age siblings, and normally grow up as members of groups of nonsibling peers and/or older and younger siblings. According to Jolly (1972), "the striking characteristic of young, socially living primates is their social play" (p.261). The play group is the context of primate passage from dependence on the mother to membership in the adult society, and a substantial body of evidence indicates that this context is critical for normal social development in monkeys (Harlow,

1973). In the play group, which occupies the infant monkey for up to 80 per cent of its waking time, the infant learns its status in the dominance hierarchy, develops skills necessary for survival, and learns to control aggression. Monkey play groups are often sexually dimorphic, with the females preferring grooming and infant caretaking, and the males engaged in rough-and-tumble play. With squirrel and rhesus monkeys, play groups are constituted of age-mates (Symons, 1978). But, in all other monkey species, play groups are characterized by a diversity of age, ranging from infancy to puberty and in some cases to adulthood. Although playful interaction is generally more likely to cross age lines when groups are small, cross-age play has been observed in many large-group monkey societies, in which age mates are readily available.

Homo sapiens' nearest living relatives are the apes (Pongidae), the gibbon (a small ape), the orangutan, the gorilla, and the chimpanzee (the great apes). Much has been discovered about the great apes by extensive studies in the wild conducted since 1960. Schaller's (1963) studies of the mountain gorilla show it as a very placid and unaggressive animal. Vigorous play begins at about five months; infants frequently play alone. Infants (age 0-3) and juveniles (age 3-6) often play together, but adults are rarely involved in play. Most frequent forms of play are wrestling, follow-the-leader, and King of the Mountain.

> Sometimes juveniles sat beside infants and draped an arm over their shoulders. Although dominance was occasionally asserted by the juveniles, they were extremely gentle with the infants. Exuberant play never resulted in the injury of an infant or even in a quarrel. When the juvenile was not willing to play, it merely ignored the infant or rebuffed it lightly. (p.271)

The orangutan differs from the other great apes, and, in fact, from almost all primates, in its solitary lifestyle. Although infants play with, or at least play beside, other infants when they encounter them, they typically grow up only inthe company of their mothers and live alone as adults. Adult male arangutans emerge from solitude only to fight other males and mate with females (Kevles, 1976). It is not known whether the dispersed nature of the orangutan population is a long-standing evolutionary adaptation or the result of relatively recent depredation by humans or other enemies.

Goodall's (1965) studies of the chimpanzee, the ape biologically closest to humans, show that infants spend most of their time playing individually, with other infants, and with juveniles. She comments that "the latter are very gentle when playing with infants and are always quick to run and help them up or down a difficult climb" (p.460). Juveniles play with other juveniles most

frequently, but occasionally with infants or adolescents. Playful behavior decreases after puberty. However, siblings (always separated by a minimum of 3½ years) are invariably fascinated by infant brothers and sisters and play with them extensively (Lawick-Goodall, 1971).

Experimental studies conducted at the University of Wisconsin Primate Laboratory further illuminate the significance of cross-age socialization in monkeys. It should be noted that many of the studies have been conducted with rhesus monkeys, which are atypical in that their play groups are generally homogeneous in age. Studies of rhesus monkeys indicate that, even with monkeys removed from their mothers at birth, normal social development occurs provided they receive experiences with numerous peers during their first year (Sackett, 1973). In one experiment, four monkeys were reared in total isolation for their first six months. At the end of this period, the monkeys failed to exhibit normal social behavior, were attacked by age mates, and engaged in self-clasping, self-mouthing, huddling, and stereotypic rocking. They were then exposed to three-month-old "therapist monkeys," whose social interactions did not yet include aggression, and consisted of clinging and simple play. Within a week, the isolates began to reciprocate the clinging and soon afterwards to play. By one year of age, the isolates and the therapists were virtually indistinguishable in terms of absence of pathological behavior and sophistication of social behavior (Suomi & Harlow, 1972). In a paper for the American Journal of Psychiatry, Suomi, Harlow, & McKinney (1972) commented, "We are all aware of the existence of some therapists who seem inhuman. We find it refreshing to report the discovery of nonhumans who can be therapists" (p. 932).

The primate studies may be summarized as follows. In the wild, almost all of the 193 living species of monkeys and apes grow up in a society in which all ages are represented. Social experience with other young monkeys appears to be essential for normal social life as adults. In most, but not in all species, the infant and juvenile play group is heterogeneous in age.

For socially living species, the generalization appears to hold that, as creatures move up the evolutionary scale, the age composition of the infant play group is increasingly heterogeneous.

Age relations in simple societies

Humans have lived in large groups for a few centuries, and in farming communities for perhaps ten thousand years. For at least a million years, they were hunters and gatherers. Inferences concerning this stage of human evolution are often made from anthropological studies of the approximately 180 hunting/gathering societies which survived into this century. These include such groups as the Inuit, the Alakaluf in South America, the Chenchu in India, the Australian aborigines, the Ainu in Japan, the Koryaks of Siberia, the Mbuti pygmies, and the bushmen of the Kalahari desert.

These groups share certain common characteristics. They live in relatively small groups, with a modal size of about 30, and are usually nomadic. Births are spaced a minimum of three years apart. Life is communal, and the infant's experience is of interaction with all ages. The upbringing of children is shared among the adults of each group, leading to a more standardized personality and homogeneous culture than in societies in which upbringing is largely the responsibility of a single pair of biological parents (La Barre, 1954). The infant moves from intense contact with the mother to membership in the child play group; specialized child nurses, characteristic of more developed agricultural societies, are not found in these cultures; older children naturally and informally watch out for younger ones. Adolescents may be temporarily segregated in preparation for puberty rites. These cultures generally recognize broad age groups; for example, the Australian aborigines recognize five stages: childhood, adolescence, early adulthood, eldership, and "close-up-dead" (Elkin, 1964). But social

life normally consists of pervasive contact among different ages, and there is no equivalent in simple societies of the narrow formalized age-grouping of the modern school (Eisenstadt, 1956).

Typical of a hunting/gathering people are the much-studied !Kung San bushmen of the Kalahari in central southern Africa. The !Kung live in an area rich in mongongo nut trees, which provide one-third of their diet. Hunting and gathering consume only some 19 hours a week and are not required of the young or the old; all !Kung enjoy ample leisure time (Leakey & Lewin, 1977). !Kung bands average 30 to 40 people; group size tends to be stable, although the composition may change. Each nuclear family has its own temporary grass dwelling, but village life is communal, with children growing up surrounded by people of all ages. The !Kung space their children a modal four years apart, so that mothers have no more than one infant to care for at any one time. The infant is carried on the mother's hip, at eye level with "desperately maternal 10- to 12-year-old girls who frequently approach and initiate brief, intense face-to-face interactions" (Konner, 1972, p. 292). After about the age of 18 months, the infant becomes a member of the child play group, imitating and relying on older children, who take responsibility for younger ones. Draper (1976) records that "a typical gang of children joined temporarily in some play in the village might include a 5-year-old boy, an 11-year-old girl, a 14-year-old boy, and a 2-year-old toddler hanging on the fringe of the action" (p. 202). The small number of children and the absence of age mates rule out competitive and team play.

Many of these characteristics persist in more complex societies. The Manus people of the Admiralty Islands, studied by Margaret Mead, engaged in fishing, pig-raising, and trading. Although a village might have several score of children, the pattern of interaction observed by Mead (1975) was of

constant interplay among different ages.

> A boy of ten drifts--now teaching a baby to count, now organizing a game of "kick-ball" among the eight year olds, turning from that to a canoe race with a number of age mates, joining two older boys to chase a group fo small girls. . . . This easy give and take, group play, partnership, individual activity, now as teacher, now as leader, now as slavey, gives the child a maximum opportunity to develop those personality traits set in babyhood. (p. 148)

Cross-cultural studies highlight interesting contrasts in the social life of the child. The Whitings made a comparative study of five subsistence farming societies of varying complexity, and of one New England community. They found that in all cultures aggression was more frequent among age mates than among non-age mates, boys were more aggressive than girls, children tended to associate with children of the same sex, and that, while boys and girls were equally nurturant in the 3-5 age period, boys' nurturance remained unchanged, while girls became increasingly nurturant as they grew older. In the simpler societies, children spent 20-25 per cent of their time caretaking and interacting with infants, compared with 3.5-9 per cent in the complex societies. In complex societies, children's responsibilities tended to consist of individualistic chores such as cleaning a bedroom or doing homework, the benefits of which were not always obvious. In simpler societies, chores were more likely to involve the intrinsically rewarding task of taking responsibility for the safety and wellbeing of an infant. Regression analysis showed that children from complex cultures were more dominant-dependent, and less nurturant than those from simpler societies (Whiting & Whiting, 1975).

Konner (1975) draws the following conclusions from the ethological and anthropological evidence:

> Infants are inept in relating to one another for the simple reason that they were never called on to do so during millions of years of evolution; consequently they could not have been selected for an ability to do this. They were selected instead for an ability to become integrated into a multiage group. . . . The apes and protohominids went to considerable trouble to evolve for us a successful childhood in nonpeer play groups. Perhaps we should be a bit more cautious before we abandon the nonpeer pattern. (pp. 122-123)

Age segregation in Western society

The age-stratified culture in which we live is largely a product of the last two hundred years. It is the result of many factors, including the size of communities, the specialization of work, the development of transportation, and the evolution of schools.

In medieval Europe and in colonial America, children grew up surrounded by other children and adults of all different ages. Philip Ariès has noted that "in medieval society the idea of childhood did not exist. . . . As soon as the child could live without the constant solicitude of his mother, his nanny, or his cradle-rocker, he belonged to adult society" (Ariès, 1962, p. 128). The modern concept of privacy had not developed; people lived their lives publicly; acquaintances dropped into the home at random. As the home was near to or was itself the workplace, the child interacted with people at their work as well as at leisure. The unspecialized nature of much work made it possible for the child to begin to participate in adult work at an early age.

The medieval European school was highly heterogeneous with respect to age. Many schools consisted of a single master teaching a group of up to 200

fee-paying students in the cloister or the church, with specialized school rooms developing only gradually. The youngest pupils would typically be about ten years old; the oldest might be elderly men. The crowded lodgings in which medieval college students lived would contain a similar mixture of ages. By the seventeenth century, a sequential curriculum had begun to develop, according to which students moved through a series of classes. Even so, the senior class would contain students aged anywhere from 13 to 22. By the early nineteenth century, this had reduced to a range of 15-19 (Ariès, 1962).

American schools were characterized by a similar pattern of development. Children of several ages might attend the Dame School held by a New England goodwife in her kitchen, or the Petty School under the jurisdiction of a tutor hired by a Virginia family (Cremin, 1970). In the dedicated one-room school building that emerged in the eighteenth century, a full-time teacher would use individual and tutorial methods to instruct a group of 10 to 30 pupils ranging in age from 6 to 14 in a single room. The typical mode of learning was individual supervised progress through a series of readers and arithmetic books (Westby-Gibson, 1966). In the academies, ages would range from 12 to 25.

This diversity of age in school reflected a similar diversity in the child's experience of society at large. The variance in age of siblings was greater in the nineteenth century than today. Not only were families somewhat larger, but infant mortality and a high fertility rate resulted in a wide variance in sibling age. The extended family living in the same household or neighborhood further exposed the child to a wide range of ages. Social expectations were that the child, from about the age of 8, would spend much time working alongside siblings and adults on the farm, attending school mainly in the winter months. The official school year averaged 132

days in the United States in 1880, and average attendance in 1870 was only 78 days (Coleman, 1974). In Canada, attendance was even lower, 41 per cent in Ontario in 1867 and only 56 per cent by 1894 (Ross, 1896).

The modern pattern of age segregation in schools was established in both Europe and America in the nineteenth century. In both cultures, a dislike of precocity and a predeliction for standardized curricula, annual promotion, and a uniform rate of progress developed at about the same time. Horace Mann visited schools in Prussia and reported to the Massachusetts Board of Education in 1843:

> The first element of superiority in a Prussian school . . . consists in the proper classification of the scholars. In all places where the numbers are sufficiently large to allow it, the children are divided according to ages and attainments, and a single teacher has the charge only of a single class. . . . There is no obstacle whatever . . . to the introduction at once of this mode of dividing and classifying scholars in all our large towns (Mann, 1843, p. 84).

The Quincy Grammar School in Boston is usually considered the first school to have organized itself on a graded pattern, doing so in 1848. By 1852, Mann's doctrine was becoming the accepted wisdom, and was supported by reference to the industrial model of standardization:

> The principle of the division of labor holds good in schools, as in mechanical industry. One might as justly demand that all operations of carding, spinning and weaving be carried out in the same room, and by the same hands, as insist that children of different ages and attainments should go to the same school and be instructed by the same teacher (Lowell School Committee Report of 1852).

By 1890, the present-day tripartite system of elementary, secondary, and post-secondary institutions was in place. Legislation requiring school attendance from a specific age was standardizing the age of entry. Regulations stipulated the completion of every curriculum step in sequence and the provision of separate classes as soon as the number of pupils permitted. The belief that children should be divided by age was not limited to schools: the Boy Scout Movement, originating in 1908, also segregated boys into the familiar levels of Cubs, Scouts, Rovers, etc.

The process was accelerated by social trends. Industrialization took work and adults out of the home, and vocational specialization made education preparatory to rather than parallel with entry to the work force. Dispersed agricultural communities gave way to concentrations of population around industries, making large schools possible. Developments in transportation allowed schools to increase in size by drawing on a wider area. The one-room school survived in a few places into the 1960s, its death delayed by the world wars, the Depression, and the long struggle of rural communities to preserve it against the will of urban educational bureaucracies (Cochrane, 1981). But it was an anomaly, as was the rural community and the small town in which it originated, with their diversity of age, status, and occupation. By the 1950s, the standard environment of youth and adolescence was the suburb, with its restricted social class, its separation from work, and its familiar bimodal two-generation age distribution in which almost all members were either between 0 and 20 or 30 and 50 years old (Bronfenbrenner, 1967). The "generation gap" was accepted as a fact of life, the 20-30 year old group became stereotyped as swinging singles, and the over-50s were perceived as socially marginal and were segregated in high-rise apartments, retirement villages, and homes for the elderly.

The Nongraded School movement

A uniform age of entry to school, with progress through the grades on the basis of age, was firmly established as the norm by 1900. Insistence that pupils achieve success in all subjects at each grade level prior to proceeding to the next produced a small measure of age diversity due to the retention of unsuccessful pupils. This continued to decline in the twentieth century. In 1918 the standard deviation in age within American Grade 1 classes averaged 11.8 months; in 1952 it was 6.8 months. In Grade 9, the standard deviation fell from 14.1 months in 1918 to 8.6 months in 1952 (Lennon & Mitchell, 1955). By the early part of the century, schools consisted of 12 separate consecutive stages through which almost all students moved in sequence, one year at a time. Exceptions in the form of skipping or retention were sufficiently rare to confront the accelerated or retained child with the social and emotional problem of deviation from the established norm.

In addition to classification by age, pupils began to be classified by ability, particularly as standardized testing developed after 1920. By 1926, ability grouping was being used in 90 per cent of large U.S. cities (Heathers, 1969). Neither age grading nor ability grouping was without its critics, but they were generally voices in the wilderness. One of the best known was Carleton Washburne, who as Superintendent of the Winnetka, Illinois schools introduced a system of self-paced and individualized instruction in "the common essentials" which endured for two decades. Washburne's description places him clearly as a progenitor of Mastery Learning:

> Under the old régime, in the effort to give different children the same subject matter in the same length of time, the quality of the children's work, the degree of their mastery, varied from poor to excellent, as attested by their report cards. But under the Winnetka technique of individual education,

> instead of quality varying, time varies: a child may take as much time as he needs to master a unit of work, but master it he must (Washburne, 1925, p. 79).

The attempt by many school boards to imitate the Winnetka system in less radical measure produced something quite different: "dividing the students in each grade into sections of slow, average, and rapid learners on the basis of group intelligence tests" (Cremin, 1961, p. 295).

It was only after the Second World War that research began to focus on the issue of age grading in schools. In 1947, Educational Leadership published an article by Howard Lane entitled "Moratorium on Grade Grouping," in which he commented:

> Some years ago I observed in my backyard that unresolved contention, rivalry, and determination to prevail were the order of the day when everyone there was three years old, or six, or nine. When, however, there was an age range of several years, cooperation and an amount of consideration for each other were dominant. (p. 385)

In 1948, Arthur Foshay completed a doctoral thesis at Teachers College which appears to have been the first empirical examination of age grading. He compared classrooms that combined three years with conventional one-year classes at the Horace Mann-Lincoln School of Teachers College. Selection into the interage class was nonrandom: these students had a lower IQ, but their reading and arithmetic achievement at the end of one year was lower than would have been projected. Another finding by Foshay concerned children's friendship choices: in the age-graded classrooms, 81 per cent of children's friends were chosen from within the same age-grade; but in the interage classes, only 46 per cent of friends came from within the same year (Foshay, 1948). In the following year, Dreier completed a doctoral study at the

University of Minnesota in which he compared pupils after graduation from graded and nongraded elementary schools in rural Minnesota. He found no important differences between the two groups (Dreier, 1949).

Research of this kind continued in a desultory way through the 1950s. Then, in 1959, Goodlad and Anderson published The Nongraded School. Goodlad and Anderson reminded the educational community of what had been well known for years, that rates of intellectual, emotional, and physical growth are highly variable. Puberty, for example, begins in boys at any time from 10 to 15 and is complete between 14 and 18. In girls, the variation is even greater. Earlier adolescence in girls than in boys ensures that there will be a significant maturational difference between the males and females in any class of teenagers grouped on the basis of age. Nor is there any less variability among aptitudes in different curriculum subjects:

> Grouping children 'homogeneously' on the basis of a single criterion does not produce a group that is homogeneous to the same degree -- judged by other criteria . . . teachers who proceed as though their class of gifted or retarded pupils were homogeneous are fooling themselves and cheating their pupils (Goodlad & Anderson, 1963, p. 17).

Goodlad and Anderson surveyed 34 communities that had nongraded schools. The influence of their book was rapid and immense. Within a few years, thousands of school districts were claiming that at least some of their school districts were nongraded. The belief that century-old monolithic structures were crumbling was shared by many educators. The National Education Association threw its support behind multiage grouping (National Education Association, 1968). In the 1969 Encyclopedia of Educational Research, Heathers wrote:

> Writing an epitaph for grouping may well be the task of the reviewer

> of research on grouping for the 1980 edition of this encyclopedia. Even today it appears that grouping as a central theme of organization for instruction has nearly run its course. (p. 568)

But the nongraded school movement turned out to be an archetypal illustration of fashionable rhetoric concealing educational conservatism and inertia. A comprehensive review of the research on nongraded schools has yet to be conducted. Most reviews of the literature cite one or two dozen studies, but at least fifty empirical doctoral theses were completed on nongrading between 1957 and 1977. What the studies of nongrading reveal is that, although formal grade distinctions were removed in nongraded schools, this rarely made a difference to the age structure of instructional groups. In some cases it is clear that what was called nongrading was little more than ability grouping within existing grade levels. In other cases, the conventional age structure was deliberately maintained. Thus a report on a nongraded experiment in an Oregon elementary school stated that "no pupil is placed in a group where he would be more than one year older or one year younger than the other members of his class" (Hart & Smedstad, 1967, p. 180). Most experiments in nongrading took place in the primary grades, and it is clear that in the great majority of nongraded schools almost all pupils entered school at approximately the same age and spent no more and no less than three years in Grades 1-3. In such cases, it is doubtful that the variance in age in instructional groups was greater in nongraded than in conventional classrooms. Goodlad himself was well aware of the ways in which the ideas he had promulgated were being traduced. In 1968 he wrote:

> My own view . . . is that there are, indeed, precious few nongraded schools . . . the concepts guiding nongrading are becoming part of the rambling rhetoric, the cant of current educational orthodoxy. . . .

> I fear that American education is now absorbing the concepts without effecting the changes implied by them. The much heralded revolution in American education is being in large part blunted on the classroom door (Goodlad, 1968, pp. 4-5).

In 1974, the Panel on Youth of the President's Science Advisory Committee, chaired by James Coleman, in its report Youth: Transition to Adulthood, made a comprehensive critique of age segregation, urging that

> it is important that environments for youth provide opportunities in caring for others who are younger, sick, old, or otherwise dependent; and to engage in activities that are responsible in the sense that they have significant consequences for others. This is a most important apprenticeship for prospective obligations as spouse, parent, and citizen (Coleman, 1974, p. 5).

But the schools were not listening. Having never implemented the reality, in the 1970s they found it possible also to abandon the appearance of change, and they reverted openly to the pattern of age grading that has existed since the beginning of the century. The rigidity of the assumptions is illustrated by this anecdote concerning a mother who attempted to enrol her son in a preschool program before his third birthday.

> As soon as I gave her Elihu's birthdate, she gasped in horror.
>
> "Then he won't be a two-nine!"
>
> "He won't be a what?"
>
> "He won't be a two-nine by September. He'll only be two-eight. He wouldn't be able to handle our program."
>
> "Oh," I said. (Rubin, 1979)

Experimental studies of multiage grouping

Twenty-six studies were located, conducted between 1948 and 1981 in the United States and Canada (Adams, 1953; Bizman, 1978; Bowman, 1971; Burchyett, 1973; Carbone, 1961/62; Chace, 1962; Dreier, 1949; Finley & Thompson, 1963; Foshay, 1948; Halliwell, 1963; Hamilton & Rehwoht, 1957; Hart, 1962; Hillson, Jones, Moore, & Devender, 1964; Hobley, 1976; Hoen, 1963; Hopkins, Oldridge, & Williamson, 1965; Hull, 1958; Junell, 1971; Lair, 1975; Milburn, 1981; Morrow, Quilling, & Fox, 1969; Papay, Costello, Hedl, & Spielberger, 1975; Shrankley, 1976; Skapski, 1960; Yerry & Henderson, 1964; Zerby, 1961). All examined the results of multiage grouping in elementary schools. All "multiage" classes contained a range of two or three years. Achievement variables were usually reading and mathematics scores on standardized tests. Social/emotional variables were more commonly attitude toward school and self-concept. Many of the studies suffer from weak design, with lack of adequate control of differences between teachers and schools which elected or rejected multiage grouping. An endemic difficulty in the research is that of separating the effects of age heterogeneity from those of individualization and intraclass grouping which is usually concomitant. Typical of weak control was one study (Chace, 1962), which compared students in multigrade classrooms in a university laboratory school with children in conventional public school classrooms. Finley & Thompson (1963) defined multigraded schools as those with four teachers or less, and compared them with schools which had at least one teacher per grade level, acknowledging that lower salaries were paid to teachers in the smaller schools. Too few of the studies reported sufficiently complete statistical data to allow anything more than a counting procedure for summation of the results.

Studies were classified as "favoring conventional grouping," "inconclusive," or "favoring multiage grouping," on the basis of the expressed judgment of their

authors, which in all cases appeared to be justified from their findings. Table 1 shows the results for all 27 studies. Table 2 shows the results from those studies which were conducted as doctoral theses. Doctoral theses are in general likely to be relatively rigorous in their design, and meta-analyses have found theses more likely to report inconclusive results (Smith, 1980).

The findings summarized in Tables 1 and 2 suggest that multiage grouping has no consistent relationship with academic achievement. Multiage grouping does, however, tend to be associated with better self-concept and attitude toward school. None of the 27 studies found a consistent negative relationship in this area. These findings are reflected in anecdotal observations and specific results. Hamilton and Pehwoht (1957) reported, "Our study seemed to indicate that in groups of children of like ages there will be much more yelling, contention, and bickering, with a struggle to be 'top dog' than is true in a group of wider range" (p. 28). A well-designed study by Carbone found significant differences on a semantic differential test. Pupils in graded schools described their teachers as little, loud, boring, hard, dull, rough, sour, stiff, and bad. Pupils in nongraded schools described their teachers as big, quiet, interesting, soft, bright, smooth, sweet, relaxed, and good (Carbone, 1961/62). Studies of teacher attitudes suggest that teachers generally approve of the structures with which they have become familiar (Moodie, 1971).

A few experimental studies have also been conducted at the preschool level. Hammack (1975) found that three, four, and five year old children made more progress in self-concept in multiage than in single-age groups. Goldman (1981) found three and four year olds in mixed age classes were more sociable than those in single-age classes. And in Israel Bizman, Yinon, Mivitzari, and Shavit (1978) found that children in age-heterogeneous kindergartens were

Table 1

Empirical Studies in Multiage Grouping:

27 Studies

	Academic Achievement	Social/Emotional Development
Studies favoring conventional grouping	3	0
Inconclusive studies	12	6
Studies favoring multiage grouping	10	9

Table 2

Empirical Studies in Multiage Grouping:

10 Doctoral Studies

	Academic Achievement	Social/Emotional Development
Studies favoring conventional grouping	1	0
Inconclusive studies	5	4
Studies favoring multiage grouping	2	3

significantly more altruistic than children in age-homogeneous kindergartens. Summarizing the results of a review of grouping patterns in several different countries, Freedman (1981) suggested that such patterns reflect the goals of the programs.

> Where the primary goal is to produce open, sociable children who are able to accept and give help, heterogeneous grouping is preferred. Where the goal is to teach a set body of material and to formalize the relationship between dependents and caregivers, homogeneous grouping is favored. (p. 9)

The empirical studies reviewed in this section can be simply summarized: (1) multiage grouping has no consistent effect on academic achievement, and (2) multiage grouping has a generally benign effect on social and emotional development.

Cross-age friendships

While experimental studies have tended to focus on achievement and attitudes, other research, particularly naturalistic and observational studies, has been more interested in companionship outside the classroom. The general picture that emerges from these studies is one of increased competition and aggression within same-age groups and increased harmony and nurturance within multiage groups (Hartup, 1979; Wakefield, 1979; Whiting & Whiting, 1975). The studies also reveal that children's friendships are influenced by both sex and age, and that these influences become increasingly strong as the child moves from infancy through childhood. Challman (1932) in a study of nursery school children ages 2½-5 found a correlation between ages of most frequent partners of .56 for boys and .32 for girls. Elementary school children in a nongraded system studied by Rhoades (1966) chose their friends from within an age band

from two years older to two years younger. A review by Hartup (1976) indicated that age correlation of friends observed in U.S. studies ranged from .30 to .90.

It could be hypothesized that a group containing an age span of two or three years would provide more opportunities for children to find appropriate friends than the conventional one-year age group. This appears to be confirmed by studies showing fewer isolates in mixed-age classrooms and schools than in conventional school settings (Adams, 1953; Zerby, 1961). This is important in view of the fact that a significant relationship has frequently been observed between friendship patterns in childhood and adult social and emotional status (Rubin, 1980); children who lack friends are prime candidates for psychiatric disorders later in life (Oden, 1980; Sullivan, 1953). Summarizing the research, Hartup (1978) concludes that "no evidence exists to contradict the hypothesis that peer relations play a central role in personality development" (p. 137). If cross-age grouping in schools reduces isolation in children, that must be counted as a significant benefit.

Patterns of friendship and social behavior change during childhood. During the 3-5 age period, both boys and girls are equally nurturant (Rand, 1976; Whiting & Whiting, 1975). But girls, as they grow older, become more nurturant and are more likely to play with and nurture younger children. Boys, on the other hand, engage in much more rough-and-tumble play (Blurton Jones, 1967). In an ethological study of 5-10 year old children in English schools, Sluckin (1981) noted the more boisterous play of boys, including chasing and "soft punches and gentle strangulation" (p. 9). This was accompanied by a preference for playing with the same sex that rose from 75 per cent for 5-6 year olds to 90 per cent for 9-10 year olds, a finding confirmed elsewhere in the literature (Halliman, 1979).

Ellis and others (1979) studied companionship patterns among 400 children

aged 1-12 by spot observations and interviews. Children were observed during afternoons for two months during the summer in neighborhoods, homes, and in summer programs in Salt Lake City. Overall, children were observed alone in 26 per cent of observations; with same-age companions in 6 per cent (this rose to 10 per cent at age 11-12); with companions within 2 years in 29 per cent; and with companions differing in age by more than 2 years in 31 per cent of observations. The study found greater variety in age when both sexes were represented in companionship groups. Similar findings were reported in a study by Montemayor and Van Komen (1980) of adolescent groups observed in three Salt Lake City high schools and in seven out-of-school settings. Friendship groups out of school were segregated by age, but not as much as in school. Out of school, 45 per cent of companions were adolescents, 37 per cent adults, and 16 per cent children. The average age difference among groups of unrelated friends was 14.01 months out of school and 6.04 months in school. Ages were more mixed in male-female groups; adolescent boys tended to associate with girls about 1½ years younger. The authors reported that in their observations of 403 adolescents over two months, "in no instance . . . was an adolescent observed with an infant or an elderly person who was not a relative" (p. 379). These recent studies complement the findings of Midwest and Its Children in the 1950s, which observed that children spent the majority of their time with other children who differed in age from themselves by more than 12 months (Barker & Wright, 1955).

While unrelated adults and adolescents rarely associate out of school, an increasing number of programs bring them together during school hours. The 19 students in a mixed-age summer school class in basic education in Maryland, reported by Harmon (1978) and Steurer (1978), ranged in age from 14 to 70. The teacher stated that "for this instructor in a mixed-age classroom no

problems were evident in being such a mix of students. This particular group was cohesive, interested and expressed concern for one another" (Harmon, 1978, p. 5). Steurer (1978), studying the same class, noted that "it was the adult group that 'broke the ice' on the first day and made the teenagers feel as equals. Soon thereafter all students mixed more freely academically and socially, but the adults remained more assertive during the course. . . . The mixed-age class was characterized by a level of maturity associated with adult behavior" (pp. 3-4). When asked whether they would like to participate in a mixed-age class again, typical responses were, "I would love to participate in a mixed-age class again. It is great the way that the different age groups can work with each other"; "Yes, I would participate in a mixed-age class. I enjoyed it and felt I learned a great deal more than if in a single-aged group" (p. 7).

A program in a Kingston (Canada) secondary school brings together teenagers and senior citizens. Seniors attend regular classes, and teenagers also visit the elderly outside the school to provide help and company. "I get along beautifully with the young students," said one senior citizen. "I'm thoroughly enjoying it all, even the homework" (Bowering, 1978b). "I haven't done much of the talking," said a 17-year-old student. "I just sit there and listen. I feel really comfortable with them and they have so much to say. I'm learning a great deal about life and living from them. . . . I've learned that old age can be a wonderful thing" (Bowering, 1978a). A common perception runs through the comments of participants in such programs: surprise that the relationship between adolescents and adults can be so enriching, that the generation gap is not insuperable. This is most marked in instances when a parent and child attend the same class; stereotyped perceptions built up in the home seem to fade, and a new respect develops for the other as an individual.

These anecdotal impressions are supported by surveys of the elderly. The majority of respondents surveyed by both Daum and Getzel (1980), who analyzed data from 2700 people over 65, and Spouse (1981), who surveyed 482 older adults in educational and recreational programs, expressed a preference for programs that allowed interactions with people of all ages.

Effects of multiage grouping on older and younger adults

Substantial evidence suggests that the main beneficiaries of mixed-age groups are the younger members. Piagetian theory posits that interaction between children at different levels of maturity will stimulate disequilibrium, equilibration, and cognitive growth in the less mature partner (Piaget, 1950); this has been supported empirically (Bunting, 1974). Bronfenbrenner (1979) suggests the general principal that, "if one member of a dyad undergoes developmental change, the other is also likely to do so" (p. 65). Milburn (1981) noted that, although overall achievement was not significantly different in multiage and same-age classrooms, the youngest students in the multiage groups consistently outperformed their peers in the control groups. Other studies have shown that imitation is more frequent in mixed-age groups (Lewis, Young, Brooks, & Michaelson, 1975), and that young children will imitate impartially film models of older children and of children of the same age whom they have been told are older (Peifer, 1971). Children respond differentially to other children older and larger than themselves (Graziano, 1978). Relative age is clearly an important factor in children's social perceptions, and, especially when it is not obvious from relative size, children will question one another about their age (Hartup, 1977; Lougee, 1979).

Imitation seems to have particular importance in development of vocabulary. Vocabulary frequently shows up as a factor in those achievement studies favoring

multiage groups. Hamilton and Stewart's (1977) research suggested that children are more likely to learn vocabulary from slightly older children than from adults. Young children do receive more verbal stimulation when grouped with slightly older children than they do when grouped with age peers (Lougee, Grueneich, & Hartup, 1977). However, if the age discrepancy is too wide, for example, four-year-olds grouped with six-year-olds, or Grade 1 with Grade 3, less interaction will occur (Day & Hunt, 1974; Graziano, French, Brownell, & Hartup, 1976; Way, 1979). The increased verbal interaction is accompanied by positive social reinforcement (Charlesworth & Hartup, 1967).

Imitation of older by younger children continues into adolescence. Blythe, Hill, and Smyth (1981) examined schools with different grade structures and found that "the effects of older on younger students were almost always in the direction of increasing the sophistication and precocity of the younger students' behaviors. . . . Older students clearly act as models for younger students in a wide variety of ways, both positively and negatively" (pp. 108-109).

An important question is whether these advantages to the younger members of multiage groups are obtained at the price of disadvantaging the older members. There is some evidence that multiage grouping produces more interaction and sociability in younger children but depresses that of older children (Hartup, 1977; Lougee, Grueniech, & Hartup, 1977; Vandell & Mueller, 1980). Other studies suggest no negative effects (Bates, 1975). Benefits were unequivocally to the older children in an experiment conducted by Furman, Rahe, and Hartup (1979). It will be recalled that "monkey isolates" were successfully treated by "monkey therapists" younger than themselves. Twenty-four socially withdrawn preschool children (average age 57 months) were assigned to three conditions: no treatment, socialization with an age mate, or socialization with a child 12-20 months younger. After 10 play sessions over 4-6 weeks, 7 of the 8

children with younger partners had improved significantly, compared with only 3 of the 8 children with same-age partners. Although the beneficiaries in this case were chronologically older, they were less socially developed.

The evidence on cross-age tutoring is relevant at this point. There are many studies reporting highly favorable cognitive and affective consequences for both participants in cross-age tutoring (Allen, 1976; Devin-Sheehan, Feldman, & Allen, 1976; Lippitt & Lohman, 1965; McGee, Kauffman, & Nussen, 1977; Yogev & Ronen, 1982). In an early experimental study, Ferguson (1965) found that reinforcement by either an older or a younger child was significantly more effective than reinforcement by an age-peer. Bronfenbrenner (1969) has frequently referred to the Soviet practice whereby each school class "adopts" a younger class whose members the older children escort to school, play with, and help with their school work. Much of the reporting in these studies is anecdotal; most of it is enthusiastic. A comprehensive meta-analysis by Cohen, Kulik, and Kulik (1982) supported the positive effect of peer tutoring on tutors and tutees on cognitive achievement and attitude toward the subject, and small or insignificant effects on self-concept. This analysis also pointed to greater effects of cross-age than same-age tutoring. Mean effect size on tutee achievement was .29 for same-age studies, .49 for cross-age studies. Mean effect size on tutor achievement was .28 for same-age studies and .35 for cross-age studies.

Finally, some effects of age mixing are indicated by the research on birth order. There are numerous studies showing the superior achievement, career success, earlier maturity, greater nurturance and responsibility of first-born children (Bossard & Boll, 1956; Staub, 1975). In academic achievement, motivation appears to be a key variable; Adams and Phillips (1972) found that when motivation was controlled the significant differences in intellectual and

academic performance disappeared. These findings doubtless reflect relationships between children and parents as well as among siblings. The literature also shows advantages to later-born children. They are more socially responsive (Vandell & Mueller, 1980), and more popular with their peers (Miller & Maruyama, 1976). Although first-borns in the military are more likely to volunteer for hazardous missions, they find them more stressful and are less successful in them than later-borns (Helmreich, 1973). At its simplest, the theory is that the more powerful first-borns develop a greater sense of responsibility; the less powerful later-borns develop greater interpersonal skills of negotiation, tolerance, and accommodation (Miller & Maruyama, 1976).

Conclusions and implications

The attempt has been made in this paper to review the evidence germane to the issue of segregation of pupils in school by age. Three conclusions follow from the evidence:

1. Segregation of children into narrow age cohorts is a recent departure from social patterns existing for millions of years;
2. Increasing the variance in age of instructional groups does not appear to threaten the welfare of any pupils;
3. Interaction among individuals of differing ages appears to confer certain affective benefits.

A question basic to the organization of schooling is, What are the critical criteria for selecting students into instructional groups? The research reviewed in this paper does not answer that question; it merely indicates that homogeneity of age is not a critical criterion. The paper does not address such questions as, If diversity of age is desirable, how much diversity of aptitude, motivation, etc., are also desirable? For how much of the school day and for how many months

or years should instructional groups remain intact? How many different teachers can learners at different ages interact with successfully? In the absence of answers to these questions, we cannot point to any particular alternative mode of structuring instructional groups as unequivocally beneficial. We can, however, say that, if there are sound reasons for modifying existing grouping structures, the need to depart from homogeneity of age should not be seen as inhibitive. It can also be suggested that schools could provide experiences of interaction with other ages in certain minimally disruptive ways, such as by cross-age tutoring and by encouraging adults and senior citizens to participate in schools as students, aides, and volunteers. Schools can also organize extracurricular group activities that cut across age lines.

In one sense, the evidence on age composition of instructional groups vindicates the conventional assumption that what is most natural is most educative. Reflection on the evidence suggests that there is nothing natural about age segregation. A natural learning group, like a natural social group, is one in which a commonality of interest and a shared readiness for a task is complemented by a diversity of age and other characteristics. If schools could approach this ideal, they might become more natural and more educative places.

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